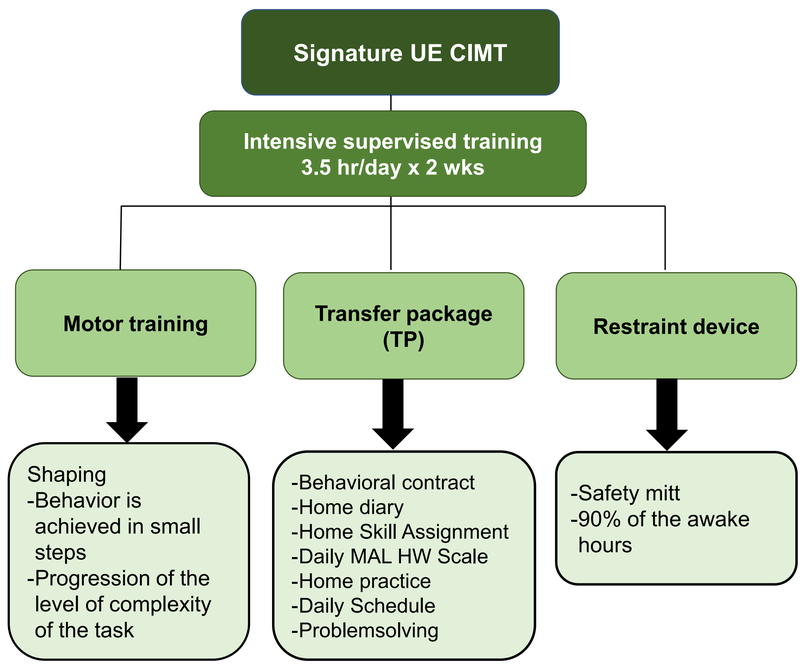
The Keys Treatment Protocol: How a Client -Centered, Potentially Reimbursable, Redistributed Delivery of Constraint -Induced Movement Therapy (CIMT) Optimizes Upper Extremity Performance

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Introduction

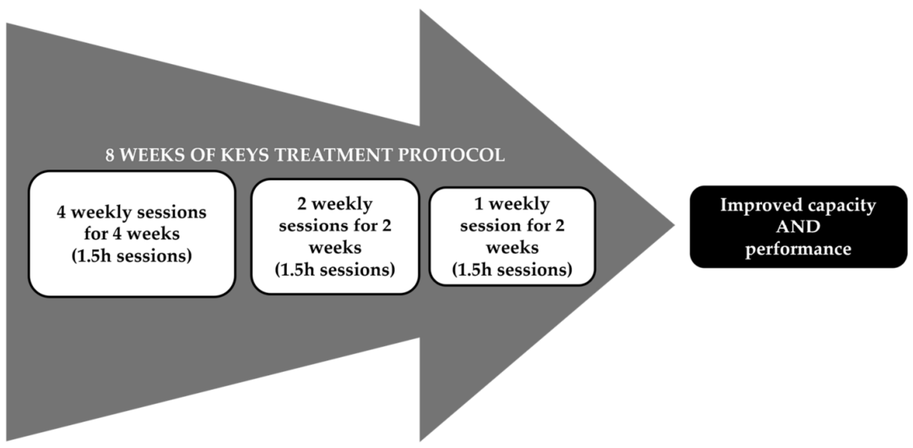
- CIMT is an evidence-based intervention for improving upper extremity (UE) capacity and performance of stroke survivors.[1]
- Signature CIMT is provided in an intensive schedule (3.5 hours/day, 5 days/week, for 2 weeks) and includes three core components: UE movement training called shaping, a set of behavioral change techniques (Transfer Package - TP), and restraint of the less-affected UE (Figure 1).[2,3]

Figure1. Components of the Signature Upper Extremity CIMT Protocol



- Despite its strong evidence on improving motor function[4-6] and use of the affected UE, CIMT faces implementation barriers due to its intensive schedule, limiting reimbursement, and feasibility in clinical settings.[7-10]
- Modified CIMT protocols have explored alternative delivery schedules, however, they omit some components of CIMT with reduced UE improvement.[11]
- The Keys Protocol includes all components of the signature CIMT protocol while distributing treatment over 8 weeks. The protocol consists of 1.5-hour sessions, 4 days/week for 4 weeks, tapering to 2 days/week for 2 weeks, and then 1 day/week for 2 weeks (Figure 2).[12]

Figure 2. Keys Protocol Treatment Schedule



Purpose: To investigate the effect of the Keys Protocol in the Upper extremity performance of individuals with chronic stroke.

Methods

- *Design:* Pilot clinical trial
- *Participants:* 7 adults with chronic stroke (>6months), with minimum movement on all joints of the affected upper extremity
- *Intervention:* Keys intervention protocol with all components of the signature CIMT distributed over an 8-week period:
  - 22 session of 1.5 hours: 4 days/week for the first 4 weeks, 2 days/week for weeks 5 and 6, and 1 day/week for weeks 7 and 8 (Figure 2);
  - Restraint mitt on the less-affected UE for 8 weeks;
  - Transfer package was adapted to accommodate the longer intervention.
- *Outcomes*: The following assessments were administered pre-, during (4 weeks of intervention), post-treatment (8 weeks of intervention), and 3 months after the intervention (3-month follow up).
  - Motor Activity Log (MAL)[13-16]
  - Canadian Occupational Performance Measure (COPM).[17,18]

Results

- 7 Individuals with chronic stroke (30.9 months since stroke, in average) were included in the study (Table 1).
- The majority of participants were White (57%), had a stroke that affected the left side of their body (57%), and were right-handed prior to their stroke (86%).

Table 1. Demographic characteristics of the participants

Participant	Sex	Age	Ethnicity /Race	Type of stroke	Time since onset (m)	Affected side	Pre-morbid handedness
1001	M	49	AA	I	20	R	R
1002	M	64	W	I	19	R	R
1004	F	71	W	H	50	R	R
1005	F	65	W	I	11	L	R
1006	F	58	AA	U	56	L	R
1009	M	67	AA	U	54	L	L
1010	M	64	W	H	6	L	R

M = Male, F = Female, AA = African America/Back, W = White, I = Ischemic, H = Hemorrhagic, U = Unsure, m = months, R = Right, and L = Left.

- Participants showed improvement on performance when comparing the scores obtained during, post-treatment and 3 months after the end of the protocol (Figure 3, and Table 2).

Figure 3. Changes in the mean scores of the MAL in all timepoints

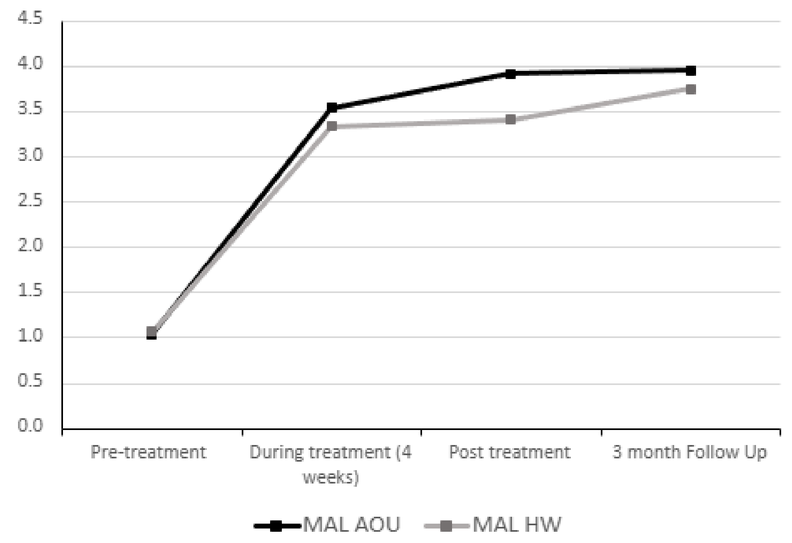


Table 2. Mean scores and Differences in scores obtained in all timepoints

Assessment	Pre	During	Post	3-month Follow up	During-Pre	Post-Pre	3-month Follow up - Pre
MAL AOU	1.0	3.5	3.9	4.0	2.5	2.9	2.9
MAL QOM	1.1	3.3	3.4	3.7	2.3	2.3	2.7
COPM Performance	1.9	5.5	6.3	6.6	3.6	4.3	4.7
COPM Satisfaction	1.3	4.7	6.1	6.1	3.4	4.8	4.8

MAL = Motor Activity Log, AOU = Amount of Use, QOM = Quality of Movement, COPM = Canadian Occupational Performance Measure.

- The difference on scores of the COPM obtained during, after the treatment and at the follow up assessment were higher than the Minimal Detectable Change (MDC) of 1.7 point for the performance scale and 2.7 for the satisfaction scale.[17]
- Same was observed on the MAL scores where difference in scores was higher than the MDC (0.67-1.27) and the MCID (1.0-1.1).[14,15]

Conclusion

- The findings suggest that the KEYS protocol improves performance of individuals with chronic stroke and their daily routine.
- The largest difference on outcome scores was observed on the middle of the intervention, for both the MAL and the COPM, however, participants continued to improve. Results were retained at the 3-month follow up.
- The Keys Protocol offers extended interaction with the TP, supporting its potential for research and clinical applications to optimize stroke recovery

References

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